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IS 9210 (1979): refrigerated display Cabinets [MED 3: Refrigeration and Air Conditioning]

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SPECIFICATION FOR DISPLAY CABINETS

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Indian Standard
SPECIFICATION FOR DISPLAY CABINETS

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(*Continued on page* 20)

Indian Standard
SPECIFICATION FOR DISPLAY CABINETS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 12 June 1979, after the draft finalized by the Refrigeration and Air Conditioning Sectional Committee had been approved by the Mechanical Engineering Division Council.

0.2 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the minimum constructional requirements, methods of determining performance, nature of type tests and production tests required to be performed, types of display arrangements and method of determining net storage volume of the display cabinets. The display cabinets included in this standard are of mechanically refrigerated type, using electric power. The refrigeration system may be hermetic/semi-hermetic or open type. The cabinets covered under this standard are intended to be used for the sales and display of packed frozen foods in temperate and tropical climates.

2. DEFINITIONS

2.0 For the porpose of this standard, the following definitions shall apply.

2.1 Temperate Climate — A climate in which the dry-bulb temperature of air surrounding the display cabinet may vary between 15°C and 32°C and in which the relative humidity of the air may rise to 60 percent.

2.2 Tropical Climate — A climate in which the dry-bulb temperature of air surrounding the display cabinet may vary up to 43°C and relative humidity may rise up to 75 percent.

---

*Rules for rounding off numerical values (*revised*).

2.3 Display Cabinet — An assembly consisting of a thermally insulated cabinet for the merchandizing of chilled foodstuffs and a refrigerating unit (which may be either incorporated in or remote from the cabinet), operating on the vapour compression system to extract heat from within the cabinet. It may be closed or open type or a combination of both and of convection or forced draught type. The cabinet may be used for frozen or non-frozen foodstuffs.

2.4 Open Type Display Cabinet — A cabinet with or without transparent panel or panels fitted to permit view of the products for display.

2.5 Closed Type Display Cabinets — A display cabinet with the means of access to be kept closed in normal use with transparent panel or panels fitted to permit the contents to be seen.

2.6 Convection Cabinet — A frozen food cabinet, where temperatures of the food products are maintained by air-circulation induced by convection from evaporation plates.

2.7 Forced Draught Cabinet — A frozen food cabinet, where temperatures of the food products are maintained by forced circulation of air.

2.8 Frozen Food Cabinet (Class F) — A cabinet in which temperature is maintained below −3°C.

2.9 Refrigerated Food Cabinet (Class R) — A cabinet designed for storing food (other than frozen food) at temperatures in the range −3°C to 10°C.

2.10 Multi-deck Display Sections — A superstructure expanding above the main body of the cabinet incorporating display shelves and refrigerated by means of cold air flowing from ducts above the shelves over the products displayed on the shelves and into the main body of the cabinet.

2.11 Manual Defrost System — Defrosting system which is affected by manual stoppage of electric supply. The duration of the defrost operation is also controlled by the action of the user. However, the removal of the defrost water or frost or ice made to be with or without the action of the user.

2.12 Semi-automatic Defrosting System — A defrosting system which is started manually but is terminated automatically, and which has suitable means of disposal of defrost water, without the action of the user.

2.13 Automatic Defrosting System — A defrosting system which is automatic in operation in starting and stoppage of the defrost cycle and which has suitable means of disposal of defrost water, which does not require any action by the user.

3. CONSTRUCTION

3.1 The frozen food display cabinet shall comply with the relevant requirements of the following Indian Standards:

IS : 660-1963	Safety code for mechanical refrigeration (*revised*)
IS : 1476-1979	Specification for domestic refrigerators (mechanically operated) (*second revision*)
IS : 5111-1969	Code of practice and measurement procedures for testing refrigerant compressors.

3.2 Materials — The materials used shall comply with the relevant Indian Standards except where such requirements are otherwise specified in this standard. Materials used shall not shrink, warp or cause bad odours under normal conditions of use and shall be resistant to attack by local vermin. Where liable to be exposed to moisture under normal use the materials shall be resistant to moisture and shall not contaminate food placed in contact with them. Sealing materials used shall not lose their essential properties and shall not contaminate food. Materials for shell and liner shall be corrosion-resistant or shall be rendered corrosion-resistant by appropriate treatment.

3.3 Insulating Materials — Suitable means shall be used to prevent the deterioration of thermal insulation by the ingress of moisture. Where the insulation space is vented to the inside, steps shall be taken to ensure that particles of the insulation material cannot escape into the food display and storage space. For fibrous materials, it shall not be possible to insert a probe of 1 mm diameter through any aperture which allows access to the insulating material, the test probe being applied with negligible forces.

Insulating material shall be free from objectionable odour. It shall be incapable of supporting mould growth or vermin and of prompting corrosion.

3.4 Finish — Internal and external finishes shall be durable and capable of being cleaned effectively and hygenically. Finishes shall not crack, chip, flake, rub off or soften under conditions of normal service, and cleaning.

Where organic finishes are applied, protection against corrosion shall be ensured giving effects equivalent to phosphating. Cadmium plating shall not be used on any part of food storage area and its fittings.

3.5 Strength and Rigidity — The display cabinet and its parts shall be constructed with adequate strength and rigidity for normal conditions of handling, transport and usage.

Any part (moving, hot or cold) which might, in normal circumstances, constitute an accident hazard, shall, as far as reasonably practicable having regard to the use to which the equipment is to be put, be effectively guarded when the display cabinet and associated refrigerating system are installed.

Pipes and connections to moving or resiliently mounted parts shall be arranged so as not to foul or transmit vibrations to other parts. All other pipes and connections shall be securely anchored and sufficient free length shall be provided to prevent failure due to fatigue. Where necessary, pipes and valves shall be adequately insulated. Lamp shall be effectively protected from mechanical damage. Glass panels shall be located or reasonably protected so as to prevent chipping and splintering in normal use.

4. VOLUME AND AREA RATINGS

4.1 Volumes — The volumes shall be expressed in litres to the nearest litre.

4.1.1 *Gross Internal Volume* — Gross internal volume shall be the product of width, depth and height of the enclosed space.

4.1.2 *Net Volume* — The net volume shall be the internal volume available for food storage inside the load limits as specified in **5.2**. It shall be obtained by deducting the volumes of internal fittings permanently fixed in the cabinet and the volumes of shelves, partitions and baskets essential for the proper operation of the cabinet from the gross internal volume.

4.1.3 *Volume of Shelves, Partitions and Internal Fittings* — The volume of a shelf, partition, or internal fitting (excluding baskets) shall be the product of its area and thickness.

4.1.3.1 The area of the shelf shall be the product of its width and depth, measured as indicated below:

> Where part of a shelf is out away, the area of the cut-out shall be deducted.
>
> Where the edge of the shelf is not more than 25 mm from the cabinet lining, the shelf shall be considered as extending to the lining for the purpose of calculating shelf area. Where there is an excess door in a wall of the cabinet, the inner surface of the door shall be considered as being the liner surface of the lining.

4.1.3.2 The thickness of the shelves and partitions shall be the distance between the outer surfaces excluding the edges, where these are reinforced (*see* Fig. 1).

4.1.4 *Corrugated Surfaces* — Where surfaces are corrugated or fitted with pipe grids, the plane through the apices of the corrugations or pipes shall be used for calculating volumes except that where the clear distances

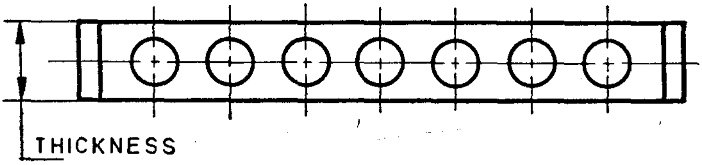


FIG. 1 THICKNESS OF SHELVES

between adjacent corrugations or pipes is greater than 100 mm, the surface itself shall be used and a volume shall be deducted for each corrugation or pipe equal to the product of width, the distance from the surface to the outside of the corrugation or pipe and the length of corrugation or pipe.

4.1.5 *Volume of the Baskets* — The volume of the baskets to be deducted from the gross internal volume for determination of net volume shall include the space not available for storage at each side and end of the baskets and the volume of the bottom of the basket (*see* Fig. 2).

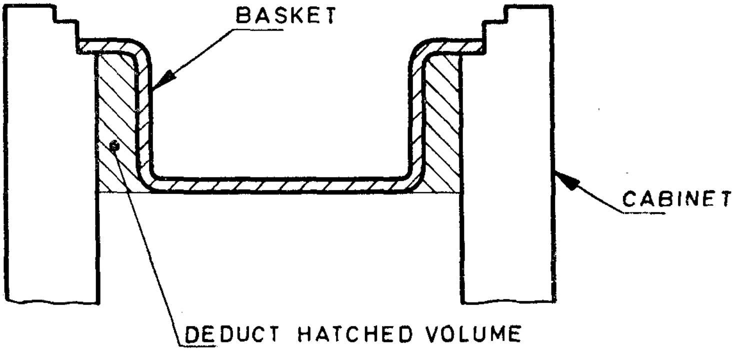


FIG. 2 DEDUCTION OF VOLUME FOR BASKET

4.2 Determination of the Display Area

4.2.1 The display area shall be the product of the smallest dimensions of the cabinet display opening and shall be stated in square metres to the nearest 0·01 m².

4.2.2 If the cabinet is fitted with access doors, lids, or transparent panels, the display opening shall include the product of the smallest dimensions of the transparent panel(s). Doors and lids shall be in the closed position.

4.2.3 Area of mirrors arranged to reflect a view of packets and opening for the display of other than frozen foods shall not be included.

4.2.4 Figure 3 gives examples of display opening calculation.

4.2.5 The measured area of the display opening shall be at least 97 percent of that stated by the manufacturer.

5. LIMITATION OF LOADING

5.1 Every display cabinet shall be clearly and permanently marked with a line or lines on the inside to denote the loading limit which in effect is the boundary surface of the storage volume. The loading limit shall be the surfaces within which the test packages can meet the temperature requirements specified in **9.3.3**. Warm or fresh produce shall not be loaded in display cabinets.

5.2 Unrefrigerated Surface — Adequate mechanical spacing devices shall be provided to prevent frozen food packages from making direct contact with surfaces which are not directly refrigerated.

If the floor of the cabinet is not directly refrigerated, a shelf shall be provided above the floor to allow adequate ventilation between the floor and the product.

6. REFRIGERATION SYSTEM

6.1 There shall be suitable means to prevent water condensed on cold parts of the display cabinet from affecting the operation of the refrigeration system or its controls.

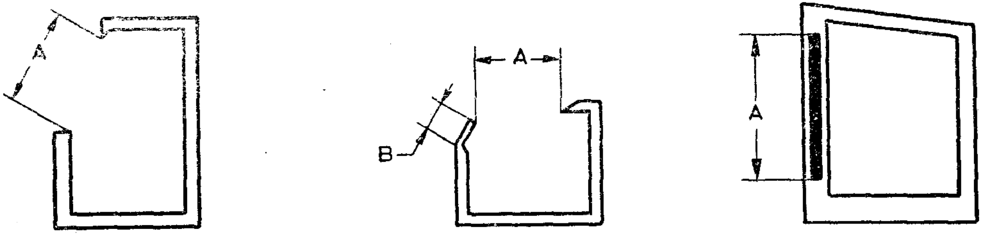
6.2 For cabinets fitted with doors or lids the refrigerating system shall be so designed that it will suffer no damage if any door or lid in the display cabinet is left open accidently while the display cabinet is operating in an ambient temperature of 25°C. When the door or lid is left open under normal operating conditions, an automatic overload protective device may come into operation.

6.3 The refrigerant used shall be one of the fluorinated hydrocarbons or a mixture of them.

7. ELECTRICAL COMPONENTS

7.1 Electric Motor — The electric motors for hermetically sealed compressors shall be so constructed that the constant pressure of oil and refrigerant under working pressures and temperatures has no adverse action on the insulation material and winding.

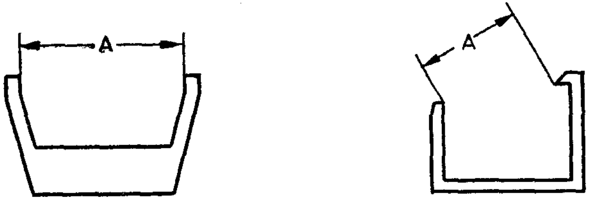
7.2 Compressor Motor Overload Protector — The compressor motor shall be connected through a current and temperature sensitive protecting



VERTICAL CABINET
DISPLAY OPENING = L x A

OPEN TOP CABINET
DISPLAY OPENING = (L x A) + (L x B)

VERTICAL CLOSED DISPLAY CASE
DISPLAY AREA = l x A



OPEN TOP CABINET

DISPLAY OPENING = L x A

L = Length of display opening
l = Length of transparent panel

FIG. 3 DISPLAY AREAS

device which is capable of automatically disconnecting the motor from the line in case the motor is electrically or thermally overloaded either during starting or running.

7.3 Flexible Cord — Cabinets shall be fitted with good quality wire which shall have ample capacity to carry the maximum current required without showing any sign of strain. They shall conform the requirements of IS : 434 (Part I)-1964* or IS : 694 (Part I)-1964†, whichever is applicable. The wire shall be so arranged that there is no mechanical damage nor any damage due to heat, oil, moisture or corrosion. Whenever electrical connections have to be made, they shall be done with a suitable mechanical connection or the joint shall be soldered or brazed. The insulation used to electrically insulate these joints shall not be less than the value of the original insulation used on the wire. The electrical connection shall be either made by means of suitable mechanically tight connectors or their ends shall be soldered and formed into eyelets so that they can be securely held in position. Care shall be taken so that the insulation is not destroyed whilst performing the soldering operation. Corrosive fluxes shall not be used. All electrical connections and components shall be adequately guarded and insulated so that there is no chance of getting any accidental electrical shocks at any time during normal usage. Where any cord or cable passes through metal holes, such holes shall be so shaped as to protect the cord from damage or abrasion.

7.4 Wiring — Electrical wiring and connections shall conform to the requirements of IS : 732-1963‡ and also to the Indian Electricity Act, 1910 and Indian Electricity Rules, 1956. All electrical joints shall be electrically and mechanically secure.

7.5 Accidental Contact — Live parts shall be protected by suitable guards, shields or screens of adequate strength and durability to avoid the accessibility of making inadvertent contact therewith during normal service conditions.

7.6 Electrical Accessories — All internal electrical fittings, such as lamps, switches, etc, shall be provided with guards for protection against mechanical damage and shall be suitable for operation at the lowest air-temperature likely to occur.

7.7 Terminals — The materials, design, and proportions of all terminals shall be such that connections made thereto will not slacken or overheat the normal conditions of use. Terminals shall be such that conductors connected thereto are rigidly and effectively clamped between metal surfaces. Terminal screws and nuts shall engage for at least two full turns.

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*Specification for rubber-insulated cables: Part I With copper conductors (*revised*).

†Specification for PVC insulated cables (for voltages up to 100 V): Part I With copper conducters (*revised*).

‡Code of practice for electrical wiring installations (system voltage not exceeding 650 volts) (*revised*).

7.8 Provision for Earthing — The cabinet shall be provided with a suitable terminal for attaching the earth conductor and this terminal shall be in effective electrical contact with accessible metal parts during normal use or when any cover or casing, removable without the use of tools, has been removed and which is liable to become live in the case of breakdown of electrical insulation.

The earth terminal shall be so designed that the pressure necessary to clamp the conductor shall not serve to secure any other component. The terminal shall be clearly and indelibly indicated by the letter 'E' and the symbol ⏚ or by green or green/yellow colour and the symbol ⏚.

8. PERFORMANCE REQUIREMENTS

8.1 Pull Down Test — With the cabinet working under no load and without thermostat in the circuit at ambient temperature of 43°C, the time required to pull down the average cabinet air temperature from 43°C to the declared temperature shall not exceed 6 hours.

8.2 Power Consumption and Percentage Running Time —The power consumption and percentage running time as measured during the test described in **9.4** shall not exceed the values stated by the manufacturer by more than 5 percent.

9. TESTS

9.1 Classification of Tests — Tests shall be classified into the following three groups:

a) Type Tests,
b) Production Routine Tests, and
c) Acceptance Tests.

9.1.1 The following shall constitute the type tests:

a) Product Temperature Test (*see* **9.3**),
b) Power Consumption Test (*see* **9.4**),
c) Water Vapour Condensation Test (*see* **9.5**), and
d) Defrost Test (*see* **9.6**).

9.1.1.1 Two cabinets of each size shall be sent along with manufacturers detailed specifications to the recognized testing authorities for purposes of type tests. The samples shall be picked up at random from stock or routine production.

9.1.2 Production Routine Tests — Every cabinet after completion shall be subjected to the following routine tests at the manufacturer's work without loading the cabinet:

a) Pressure leak test,
b) Insulation resistance test,
c) Test for earthing,
d) High voltage test,
e) Thermostat test, and
f) Door seal test.

The manufacturer shall furnish with each cabinet a certificate that the production routine tests prescribed have been conducted in accordance with the procedure given and that the unit conforms to the requirements given in **9.7**.

9.1.3 *Acceptance Tests* — If the purchaser desires any of the production routine tests to be repeated, where agreed to between the purchaser and the manufacturer, the test may be conducted at the manufacturer's works and the number of samples for these tests shall be as agreed between the manufacturer and the purchaser.

9.2 Preparation for Type Tests

9.2.1 *Installation of Test Units* — A representative of the manufacturer or of his authorized servicing agency shall be given the opportunity of installing the cabinet in the testing space. He shall make only such adjustments as are normally made in a routine installation on a purchaser's premises.

The cabinet and refrigerating mechanism shall be assembled and set up exactly as they would be installed in normal service and as nearly as practicable in accordance with the stated or known intentions of the manufacturer. Defrosting trays and all permanently located accessories shall be in their proper places during all tests, except as limited by the test conditions/specified in this standard.

The cabinet shall be shielded from direct radiation from the test room heating equipment where such requirement is at a temperature greater than 6°C above the ambient air temperature and from air currents having velocities greater than 0·25 m/s. Adequate ventilation of the condensing unit shall be provided in accordance with the manufacturer's recommendation. The condensing unit is installed separate from the cabinet and it shall be subjected to the same atmospheric conditions as the cabinet throughout the tests.

Before the display cabinet is put on test, it shall be given a minimum run in period of 24 hours, or sufficient to ensure a thorough working in of mechanical parts.

9.2.2 *Instruments*

9.2.2.1 Watt-hour meters shall be capable of being read to 0·01 kW.h.

9.2.2.2 The temperature shall be measured with thermocouples or other temperature measuring probes, which are inserted in the centre of a copper mass weighing 25 g and of minimum external area (diameter = height = about 15 mm).

9.2.2.3 Relative humidity shall be measured either by means of ventilator psychrometer having thermometers of an accuracy of 1°C or with recording apparatus of equivalent accuracy. When psychrometers are used, it shall be necessary to carry out measurement at regular intervals.

9.2.2.4 Where used for measuring test package temperature, the temperature sensitive part of thermometric devices shall be in the form of a square sheet of copper having sides of 25 mm and thickness 0·5 mm and shall be inserted at the geometric centre of the test package.

9.2.3 *Test Conditions*

9.2.3.1 *Freezer installation* — Unless otherwise specified the test shall be made on the freezer installed as for normal use with shelves, baskets and other fittings if any in their normal positions in accordance with the manufacturer instructions, with all containers being empty.

9.2.3.2 *General operating conditions* — Prior to the start of all tests, the unit shall be defrosted and cooling unit and the interior of the cabinet dried. Units shall be switched on after all the internal parts have achieved ambient temperature of the test. The freezer shall then be allowed to operate at the ambient temperature of the test for at least 12 hours to establish the thermal equilibrium.

The thermal equilibrium shall be considered to have reached when the mean average temperature at the given place over a number of cycles does not vary by more than ± 0·5°C in 2 hours time or at least for three consecutive cycles. When the conditions are such that cycling does not occur, the thermal equilibrium shall be considered to have established when the mean freezer temperature at 30 minutes intervals does not vary by more than ± 0·5°C in 2 hours.

9.2.4 *Electrical Power Supply* — For the test during which the freezer will be in operation, voltage shall not vary by more than ± 2 percent of the rated voltage.

9.2.5 The freezer shall be placed on a separate solid top platform resting on four legs so as to permit a free air circulation under the platform. The top of the platform shall be 30 cm above the test room floor and shall extend at least 30 cm but not more than 60 cm beyond each side of the freezer. The freezer shall be so placed or shielded as to prevent direct radiation from the test room heating equipment. Air circulation in the test room shall be such that the specified ambient temperatares are obtained within the limits of the specified tolerances. The freezer under the test shall be shielded from direct air currents and the circulation of air around the freezer shall be restricted to 0·25 m/s and if required by suitable false partition.

Before the stabilization period preceding the test, the interior of the food storage compart or compartments shall be dried. The doors of the food storage compartment or compartments shall be kept closed during the test.

9.2.6 Air temperatures will be measured by placing thermometer sensing bulb or thermocouple connected with copper mass as per **9.2.2.2** placed such that it is separated by 15 mm of air space from contact with heat conducting surface and it shall be shielded from radiating source, if any.

9.2.7 *Stabilization and Duration of Test*

9.2.7.1 *Stabilization period* — Prior to the start of the tests prescribed in **9.1.1** the unit shall be defrosted and the interior of the cabinet dried. The cabinet shall then be allowed to operate at test conditions for a sufficient length of time, but not less than 12 hours, to establish thermal equilibrium.

9.2.7.2 *Thermal equilibrium* — Thermal equilibrium shall be established as per conditions given in **9.2.3.2**.

9.3 Product Temperature Test

9.3.1 *Test Procedure* — The cabinet shall be filled to the load limits in accordance with the manufacturers published recommendations with test packages (*see* **10**) at the declared storage temperature. The cabinet shall then be tested under ambient conditions of 32°C or 43°C for temperature or tropical climate as per the conditions specified in **9.2.3** as the case may be. It shall maintain the declared cabinet temperature for at least 2 hours after thermal equilibrium has been reached.

9.3.2 *Test Readings* — Readings shall be recorded of the following data for at least 2 hours after thermal equilibrium has been reached:

a) Ambient air temperature (°C dry bulb and wet bulb) at intervals not greater than 30 minutes.

b) Temperaturers of test packages at locations selected by the manufacturer and stated in the test report by means of diagrams. Readings shall be recorded at intervals not greater than 30 minutes and when cycling occurs during the test the maximum and minimum temperature of each cycle shall be recorded.

9.3.3 *Test Requirements* — The test package temperature as recorded in accordance with **9.3.2** will be considered satisfactory if (a) the highest test package temperature does not rise 2·5°C above the declared temperature, and (b) the mean of the arithmetical average temperature of test packages which have at least one surface visible from any position shall not exceed the declared temperature (*see* Fig. 4).

9.4 Power Consumption Test

9.4.1 *Test Conditions* — The energy consumption test shall be conducted under the same conditions as the product temperature test (*see* **9.3**).

9.4.2 *Test Procedure* — The test shall be conducted concurrently with or immediate following the product temperature test with the cabinet loaded with test packages. The cabinet shall be operated for a period of not less than 8 hours after thermal equilibrium has been reached and for a number of complete cycles (that is, an equal number of 'off' periods and 'on' periods).

9.4.3 *Test Readings* — Test readings shall be recorded as follows:

a) Ambient air temperature (dry and wet bulb) at intervals not greater than 30 minutes,
b) Power input (kWh) at the completion of the test,
c) Running time at the completion of the test, and
d) Duration of test.

9.4.4 *Test Results* — From the data obtained the following shall be determined:

a) Power consumption kWh/24 m.
b) Running time in percent.

9.5 Condensation Test

9.5.1 *Test Conditions* — The condensation test shall be conducted under the same conditions as the product temperature test in **9.3**. Open retail cabinets as defined in **2.4** shall have top fully open.

9.5.2 *Test Procedure* — The test shall be conducted concurrently with the product temperature test. The temperature of the exterior surface of the cabinet shall be measured throughout the test by quick acting temperature sensitive probe or other appropriate surface temperature measuring device at locations selected by the manufacturer and stated in the test report by means of diagrams.

9.5.3 *Test Readings* — Readings shall be recorded of the following data at intervals not greater than 30 minutes:

a) Ambient air temperature (dry and wet bulb),
b) Temperature of exterior surfaces of the cabinet.

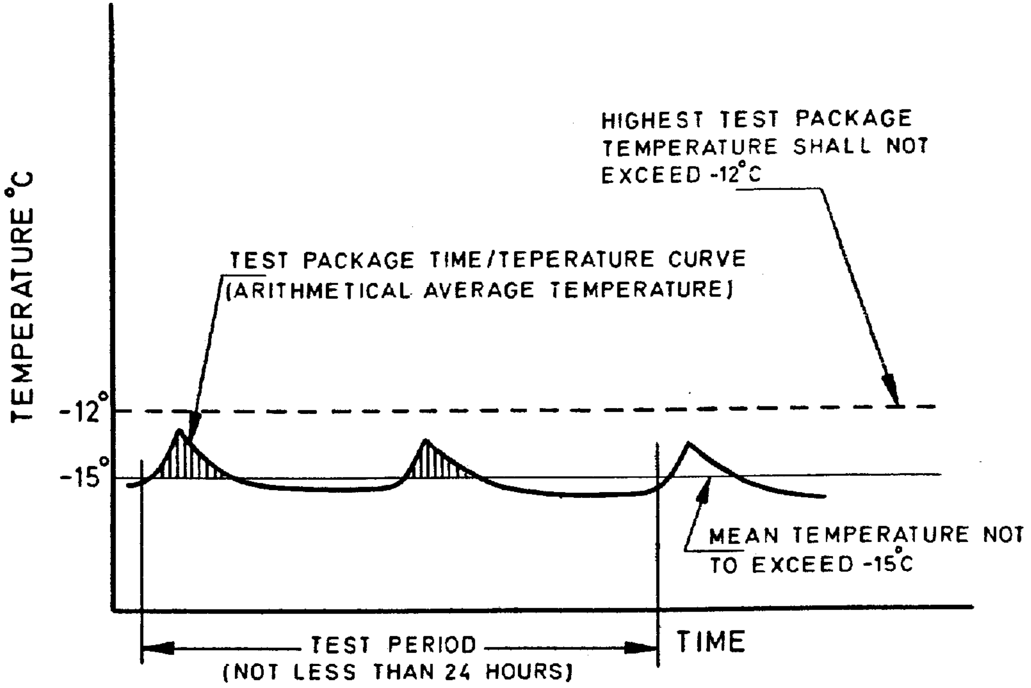

Fig. 4 Mean Arithmetical Temperature of Test Package

9.5.4 *Test Requirements* — The temperature of the exterior surfaces shall be not less than 29°C.

9.6 Defrost Test

9.6.1 *Test Conditions* — The defrost test will be conducted under the same conditions as the product temperature test.

NOTE — This test is not applicable to cabinets with manual defrost.

9.6.2 *Test Procedure* — Cabinet with semi-automatic or automatic defrost shall be operated until thermal equilibrium has been reached. They shall then be operated until four cycles of defrost have occurred. The time between the commencement of the defrost period shall be in accordance with the manufacturer's published recomendations.

9.6.3 *Test Readings* — Readings shall be recorded of the following data:

a) Ambient air temperature (dry and wet bulb) at intervals not greater than 30 minutes.

b) Minimum and maximum temperatures of test packages at points coincident with the load limits prior to and after each defrost period.

c) Duration of each defrost period (minutes).

d) Duration of test.

9.6.4 *Test Requirements* — The maximum temperature of all test packages when averaged shall not exceed the declared temperature. The highest maximum test package temperature shall not exceed the declared temperature by more than 2·5°C and after the fourth period of defrost there shall be no accumulation of defrost water in the refrigerated space.

9.7 Production Routine Test

9.7.1 *Pressure Leak Test* — All parts of the refrigerating system subject to internal pressure shall be tested. No part of the assembly under test shall show any sign of leakage or permanent deterioration when subjected to the approximate pressure given below:

Refrigerant	*Chemical Formula*	*Minimum Test Pressure (Gauge) Bar*
R 22	$CHCl\,F_2$	28
R 12	$CCl_2\,F_2$	17

9.7.2 *Insulation Resistance Test* — Insulation resistance between all electric circuits included in the cabinet and the earthed metal parts when measured at normal room temperature with DC voltage of 500 V shall not be less than one megohm.

9.7.3 *Test for Earthing* — A current of 1·5 times the rated current, but not less than 25 amperes derived from ac source with a no-load voltage not exceeding 12 V is passed between the earthing terminal or earthing contact and each of the accessible metal parts in turn.

The voltage drop between the earthing teminal or earthing contact of the cabinet and the accessible metal parts is measured and the resistance calculated from the current and voltage drop. The resistance of the flexible cord is not included in the resistance measurement.

In no case shall the resistance exceed 0·1 ohm.

9.7.4 *High Voltage Test* — Electrical insulation of all electric circuits included in the cabinet shall be such as to withstand a high voltage test of 1 000 volts rms applied for approximately 2 seconds between all electric circuits and all accessible metal parts (electrically connected together for this test) at normal room temperature. The test voltage shall be alternating, of approximately sine wave form and of any convenient frequency between 25 and 100 Hz.

9.7.5 *Thermostat Test* — Thermostat setting shall be such that when set at any point, it shall not cut in before the system pressure is balanced to such an extent that the compressor can take a start without tripping.

9.7.6 *Door Seal Test* — The purpose of this test is to ensure that the gasket of the door of the cabinet adequately prevents any ingress of the surrounding air. With the cabinet at rest, a strip of paper 50 mm wide, 0·08 mm thick and of suitable length shall be inserted at any point of the seal and the door closed normally on it. The strip of paper shall not slide freely.

10. TEST PACKAGES

10.1 Frozen food equivalent to be used for filling test packages is prepared from hardwood sawdust which has been soaked in an aqueous solution of sodium chloride having a specific gravity 1·02.

10.2 The sawdust is soaked for three days, is allowed to drain and is then packed in wrappers of plastic film of such properties that transfer of humidity to or from the ambient medium is negligible.

10.3 After filling, the wrapper is sealed and each package inserted into a non-metallic, plain white carton of moistureproof material.

10.4 The prepared sawdust is packed to give an overall package density of 560 ± 80 kg/m^3.

10.5 These test packages may be filled with any suitable material having similar thermal characteristics to those of the material specified above.

10.6 Test packages to be used for temperature measurement shall each be fitted with a thermocouple located at the geometric centre of the package and shall measure 50 × 100 × 100 mm.

10.7 Test packages other than those fitted with thermocouples, used to fill up the net storage volume, shall be made up in a similar way, to the following dimensions:

50 × 100 × 200 mm, and
25 × 50 × 100 mm.

11. MARKING AND INFORMATION

11.1 The following information shall be marked in a permanent and legible manner on one or more plates attached to the cabinet in a readily accessible position:

a) Name or trade-mark of the manufacturer.
b) Type, model, catalogue and serial number of the cabinet, or sufficient information to provide adequate identification for replacement of parts or necessary servicing.
c) Net volume in litres.
d) Chemical formula and international number designation of refrigerant used.
e) Maximum weight of refrigerant (kg) for self-contained cabinets only.
f) Normal running current, voltage and in the case of ac the frequency of the electrical supply for which the display cabinet is designed.

11.1.1 Display cabinets may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to the standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

11.2 The following information shall be made available to the purchaser when requested:

a) Display area in m^2.
b) Recommendations of loading for appropriate storage of chilled products.
c) Recommended operating procedure including:
    1) Installation of equipment
    2) Cleaning and defrosting.

(*Continued from page* 2)

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Maj Y. B. Verma	Ministry of Defence (R & D)

AMENDMENT NO. 1 MAY 1986

TO

IS:9210-1979 SPECIFICATION FOR DISPLAY CABINETS

(*Cover page, pages 1 and 3*) - Substitute the following for the existing title:

'SPECIFICATION FOR REFRIGERATED DISPLAY CABINETS'

(*Page 3, clause 1.1, line 4*) - Substitute 'refrigerated display cabinets' *for* 'display cabinets'.

(*Page 4, clause 2.3*) - Substitute 'Refrigerated Display Cabinet' *for* 'Display Cabinet'.

(EDC 66)

Reprography Unit, ISI, New Delhi, India